Against "Position"

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Abstract

Although quantum theory is presented as a radically non-classical theory in physics, it is an open secret that our present understanding of it is based on a conceptual base borrowed from classical physics, leading to the situation that all of the radical implications of quantum theory are expressed using terminology that, in other circumstances would be considered blatantly self-contradictory. To give but a few examples: wave-particle duality (one and the same ontological entity can be ascribed two mutually differing space-time pictures), superposition (a microscopic object is required to be simultaneously in two distinct and mutually exclusive classical states), and non-locality (two objects presumed to be *localized* in two distinct space-time regions forming a *single* extended system). The reason that such contradictory language is not only tolerated but taken to be physically meaningful is that through these ideas we have reaped an enormous amount of pragmatic success under a statistical interpretation (i.e. under Born's rule) of the quantum formalism (i.e. the Schrodinger equation).

Nevertheless, in this paper I shall argue that our current quantum physical ideas are not only contradictory to our intuitive thinking (involving everyday concepts), but also contradictory to the demands of the quantum formalism itself. I shall then argue that the principal prejudice that keeps us bound to the straightjacket of classical thinking in quantum theory is the idea that the basic observation in quantum physics, namely an observation that correspond to the observable **x**, reveals a 'position' in the absolute sense. This in turn has led us to treat superposition as a superposition of classical positions, and in so far as an actual observation can only reveal a single definite position, we have been faced with a measurement problem that has so far remained unsolvable. I argue that it is possible to conceive the observable **x** as an ontological *relation* and give a fully consistent epistemological interpretation of the pragmatic success of the present statistical interpretation that eschews all the aforementioned classical, self-contradictory physical terminology and also avoids the measurement problem. In the concluding part, I shall touch upon the possibilities for a new type of basic physical thinking for quantum theory that this type of analysis could open to and the attendant possibility for making new predictions using quantum theory.